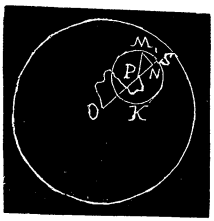
Solution by the PROPOSER.

Let R=the radius of desert, T=time, v=rate. Let P be the position of the man at any instant. Draw about P an infinitesimal circle, MSK. Call the angle MPN, θ. Then $\theta=\cos^{-1}\frac{PN}{PM}$.



Now the rate at which the man must approach the circumference in order to be off in a given time is R/T. In an infinitely small time the distance will be $(R/T)dt$.

Also $PN=vdt$.

$$\therefore\ \theta=\cos^{-1}\left(\frac{R}{Tv}\right) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1).$$

Now R, T, and v are positive. Therefore the value of θ defined by equation (1) has to do with an angle less than 90°.

Now if the man at each instant goes within the angle MPN, he will get off the desert in the given time. The chance that he will do this is

$$C=\frac{2\cos^{-1}[(R/Tv)]}{\pi} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2).$$

Hence the required probability in given by (2).

If $R=0$, or T, $=\infty$, or $v=\infty$, $C=1$. If $R=Tv$, $C=0$.

If $R>Tv$, C is impossible.

Let $R=1$, and $v=1$. To find the time which he must have at his disposal in order that he may have half a chance to get off the desert.

Clearly $T=1/2$.

PROBLEMS FOR SOLUTION.

ARITHMETIC.

75. Proposed by J. A. CALDERHEAD, M. Sc., Professor of Mathematics in Curry University, Pittsburg, Pennsylvania.

If 24 men, in 15 days of 12 hours each, dig a trench 300 yards long, 5 yards wide, 6 feet deep for 540 five-cent loaves when flour is $8 a barrel; what is flour worth a barrel when 45 men, working 5⅓ days of 10 hours each, dig a trench 125 yards long, 5 yards wide, 8 feet deep for 320 four-cent loaves? *Solve by proportion.*

76. Proposed by E. W. MORRELL, Professor of Mathematics in Montpelier Seminary, Montpelier, Vermont.

An eastern nobleman willed his entire estate to his three sons on the condition that the oldest should have one-half, the next one-third, and the youngest one-ninth. His estate, on inventory, was found to consist of 17 elephants. What should be the share of each?